Vaccine Delivery Systems

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Needs

- Biodefense preparedness and response
- Global vaccination programs

Objectives

- Facilitate a rapid deployment.
- Implement mass vaccination.
- Provide a safe, cost effective, efficient administration of vaccines.

Examples

- Oral polio (Sabin)
- Bifurcated needle for smallpox eradication program

Innovative Administration Systems for Vaccines

- **December 18-19, 2003**
  Rockville, MD

- **Sponsors: DHHS, CDC, FDA, NIH, SNS, NVPO, USAMRIID**

IASV Meeting Agenda

- Overview
- Transdermals
- Jet Injectors
- Transmucosals

Current Systems

- Multidose vials
- Single dose vials
- Single dose prefilled syringes
- Liquid (frozen)
- Lyophilized (diluents)
- Needle-syringe delivery

Multidose Vials

- Vaccine wastage
- Contamination risk
- Stability after thaw or reconstitution
- Preservatives necessary

Needles

- HCW injuries
- Misuse / reuse
- Waste control (sharps, biohazard)

Needle-Free Systems

- Simple and practical
- Less technical skill required
- No sharp waste
- Better HCW safety
- Acceptance by vaccinees
- Facilitates rapid mass vaccinations

Ideal Stockpile Vaccine

- Single dose format
- Needle-free administration
- Thermostable formulation
- Simple deployment logistics
- Ease of administration by non-professionals
- Cost effective

Vaccine Delivery

Transdermal – Transcutaneous

- Microneedles
- Microabraders
- Patches

- Access dendritc cells (Langerhans)
- Efficient immune response
- Dose sparing possible

Vaccine Delivery

Mucosal

- Liposomes
- Proteosomes
- Polyglycolide microspheres

- Access mucosal microfold M cells and Peyers patches
- S-IgA response

Vaccine Delivery

Intranasal

- Olfactory nerve fibers
- Cribriform plate
- Adjuvant sensitivities

Aerosol

- Particle size
- Special device - nebulizer

Vaccine Delivery

Jet Injectors

- Multidose reservoirs
- Single dose cartridges (?standards)
- High throughput (600 – 1000 per hr)
- Used by trained teams

- Safety (cross contamination, AEs)
- Reliability, cost

Stability

Dry Vaccines

- Powders (20um –50um)
- Microencapsulation (slow release)

Liquid Vaccines

- Formulations
- Perflurocarbon emulsions (depot)

VISION

- Thermostable
- Liquid
- Single dose
- Combination vaccine (multivalent)
- Needle-free administration

- Specific, robust immune response after one dose